

Case 3692***Columba livia* Gmelin, 1789 and *Columba livia domestica* Linnaeus, 1758 (Aves, COLUMBIDAE): proposed conservation of specific and subspecific names in conformance with prevailing usage**

Thomas M. Donegan

ProAves Foundation, Southmead, The Vale, London N14 6HN
(e-mail: tdonegan@proaves.org)

Abstract. The purpose of this application, under Article 23.9.3 of the Code, is to conserve the existing usage of the name *Columba livia* Gmelin, 1789 by granting *livia* Gmelin, 1789 precedence over the names *domestica* Linnaeus, 1758, *gutturosa* Linnaeus, 1758 and *cucullata* Linnaeus, 1758, whenever any of them is considered a synonym of *livia*. The three latter names are all subjective senior synonyms that cannot be subject to reversal of precedence under Article 23.9.1 of the Code. *Columba livia* Gmelin, 1789, the rock dove or rock pigeon, is a common bird species of pan-global distribution, the ‘wild stem’ of feral pigeons and domestic pigeon breeds and a species of economic and cultural importance. In order to conserve the trinomen *Columba livia domestica* Linnaeus, 1758, which has some modern usage in experimental biology for feral populations and domestic breeds when such a distinction is desired at the subspecies level, it is additionally proposed under Article 23.9.3 to set aside Article 24.1 of the Code and grant *domestica* Linnaeus, 1758 precedence over both *gutturosa* Linnaeus, 1758 and *cucullata* Linnaeus, 1758 whenever either of the latter is considered a synonym of the former.

Keywords. Nomenclature; taxonomy; *Columba livia*; *Columba domestica*; rock dove; feral pigeon.

1. Throughout most of the history of civilisation (Aristotle *c.* 350 B.C., Willughby 1676, Temminck, 1812, Svensson et al., 2010), several widespread, large pigeons have been recognised as occurring in western Europe. Their modern English vernacular names are the ‘rock dove’, the ‘stock dove’ and the ‘woodpigeon’. Feral and domestic pigeons are descended from the rock dove (Darwin, 1859, 1868; Stringham et al., 2012). In the 1700s, however, taxonomic confusion arose between the rock dove (including its domestic or feral derivatives) and the stock dove (e.g. Linnaeus, 1758, 1766; Brisson, 1760, Gmelin, 1789, Bewick, 1797). This was perhaps because the rock dove has never been a natural breeding bird in Sweden (Ericson & Tyrberg, 2004). This confusion was gradually resolved by Temminck (1812), Latham (1823) and Bonaparte (1854), but the former and latter authors’ new sequence, which became widely adopted, was incorrect from a priority perspective.

2. The name *Columba domestica* was established by Linnaeus (1758, p. 162) based on a type series of domestic pigeons, but as a form or variety of the stock dove *Columba oenas* Linnaeus, 1758, a taxonomically incorrect arrangement. Under Article 45.6.4 of

the Code, names proposed before 1961 as forms or varieties are deemed available as subspecific names if the other conditions for availability are met, which is the case here. Gmelin (1789, p. 769) later described what we now call the rock dove under the name *Columba livia*, as another variety of the stock dove, also under *Columba oenas* Linnaeus, 1758. He was perhaps seeking to distinguish naturally wild European populations of the rock dove from the various domestic breeds or ferals that had been referred to under a plethora of other names by Linnaeus (1758, 1766) and other early authors (see Table 1) and from the stock dove. However, his taxonomy was again based on Linnaeus's (1758, 1766) incorrect sequence.

3. Pigeons which we now refer to as of the species *Columba livia* are among the most familiar and cosmopolitan of all birds, being found in towns, cities and on coastal cliffs throughout the world (e.g. Townsend, 1915; Baptista et al., 1997). The vernacular name 'rock dove' or 'rock pigeon' is generally used to refer to the wild species or naturalised populations. The vernacular name 'feral pigeon' is also used for naturalised populations. Domestication and selective breeding have led to the development of many particular domestic breeds with recognisable plumage features, as well as racing or homing pigeons. Various individuals of these birds have subsequently escaped or bred with wild populations, resulting in the mixture of plumages today seen in the feral pigeons of towns and countryside (Goodwin, 1983). Wild-phenotype individuals can be observed within feral populations, but leucisms, melanisms and other unusual plumage features are prevalent. Intergradations between 'pure' wild stock and melanistic or leucistic individuals have resulted in flocks consisting wholly of original wild-phenotype birds being highly localised and endangered, restricted to remote regions such as the Outer Hebrides and Fair Isle of Scotland (Snow & Perrins, 1998, Gibbs et al., 2001). Darwin (1859, 1868) famously studied pigeons in detail, concluding that domestic breeds and feral pigeons were all descended from wild rock doves, a proposition previously mooted by Willughby (1676, 1678), Buffon (1771), Bewick (1797), Latham (1823) and others. This is also now supported by molecular studies (e.g. Dybus & Knapik, 2005, Stringham et al., 2012).

4. The Commission should assume that populations referred to by the two names *livia* and *domestica* (and others listed in Table 1) are widely and uncontroversially regarded as subjective synonyms at the species level and essentially universally referred to as *C. livia* (see citations below). At subspecies level, most modern authors treat all ferals, domestics and western European wild rock doves as subspecies *livia* and recognise *domestica* or other breed names only as infrasubspecific names or synonyms. As noted by Gentry et al. (2004, p. 646), the name *Columba livia* is given to both wild and domesticated birds. This pattern of usage is distinct from that found with respect to the names of various wild and domesticated animals that were ruled on in Opinion 2027 (BZN 60: 81–84, March 2003).

5. Many names were proposed for domestic breeds of pigeons in the 1700s. The status of such names described up to and including 1789 with respect to the names *livia* and *domestica* is set out in Table 1, based on Donegan (2015, pp. 26–27).

6. As noted above, the stock dove (widely referred to as *C. oenas* Linnaeus, 1758) was erroneously considered part of the same species as the rock dove/feral pigeon/domestics in the mid-1700s (e.g. Linnaeus, 1758, p. 162; 1766, p. 279, Brisson, 1760, p. 82). The name *C. oenas* was itself also based on a mixed type series, mostly of stock dove specimens but also including one feral pigeon specimen, a situation that Donegan (2015, p. 22) resolved by designating one of the illustrated stock dove specimens as a lectotype. Latham (1823, pp. 3–4) recognised the errors in Linnaeus's (1758) and Gmelin's (1789)

Table 1. Status of synonyms of the names *domestica* Linnaeus, 1758 and *livia* Gmelin, 1789 of the genus *Columba* Linnaeus, 1758

Name	Author, Year, Page	Status with respect to <i>C. domestica</i> Linnaeus, 1758	Status with respect to <i>C. livia</i> Gmelin, 1789
<i>gutturosa</i>	Linnaeus, 1758, p. 162	Has precedence under Article 24.1, having been described at a higher rank (<i>domestica</i> as a form, <i>gutturosa</i> as a species); Donegan (2015, p. 27) considered that reversal of precedence under Article 23.9.1 is not possible because the trinomen <i>Columba livia gutturosa</i> has been used albeit rarely in recent veterinary literature (e.g. López Murcia et al., 2005, p. 347, Hassanpour et al., 2011, p. 10).	Senior synonym for purposes of Article 23.1; reversal of precedence under Article 23.9.1 is not possible because of the usage noted in the adjacent column.
<i>cucullata</i>	Linnaeus, 1758, p. 162	Has precedence under Article 24.1, having been described at a higher rank (<i>domestica</i> as a form, <i>cucullata</i> as a species); Donegan (2015, p. 27) considered that reversal of precedence under Article 23.9.1 is not possible because the trinomen <i>Columba livia cucullata</i> was used by Seng (1913, pp. 1–13; 1915, p. 355) and Sievers (1939, p. 82).	Senior synonym for purposes of Article 23.1; reversal of precedence under Article 23.9.1 is not possible because of the usage noted in the adjacent column.
<i>turbita</i>	Linnaeus, 1758, p. 162	All 5 names have precedence under Art 24.1, having been described at a higher rank (<i>domestica</i> as a form, the other names as species), but all were declared nomina oblita by Donegan (2015, pp. 26–27) through reversal of precedence under Article 23.9.2 of the Code.	All 24 names are senior synonyms for purposes of Article 23.1, but all were declared nomina oblita by Donegan (2015, pp. 26–27) through reversal of precedence under Article 23.9.2 of the Code.
<i>tremula</i>	Linnaeus, 1758, p. 162		
<i>tabellaria</i>	Linnaeus, 1758, p. 163		
<i>hispanica</i>	Linnaeus, 1758, p. 163		
<i>hispidula</i>	Linnaeus, 1758, p. 164		
<i>campana</i>	Pontoppidan, 1763, p. 626	All 24 names are subjective junior synonyms.	
<i>galeata</i>	Pontoppidan, 1763, p. 626		
<i>tympanista</i>	Pontoppidan, 1763, p. 626		
<i>fulicaria</i>	Pontoppidan, 1763, p. 626		
<i>mercurialis</i>	Pontoppidan, 1763, p. 626		
<i>atricapilla</i>	Pontoppidan, 1763, p. 626		
<i>melanura</i>	Pontoppidan, 1763, p. 626		

Name	Author, Year, Page	Status with respect to <i>C. domestica</i> Linnaeus, 1758	Status with respect to <i>C. livia</i> Gmelin, 1789
<i>gyratrix</i>	Pontoppidan, 1763, p. 626		
<i>percussor</i>	Pontoppidan, 1763, p. 626		
<i>turca</i>	Pontoppidan, 1763, p. 626		
<i>vertaga</i>	Brünnich, 1764, p. 60		
<i>melanocephala</i>	Brünnich, 1764, p. 61		
<i>prolifera</i>	Brünnich, 1764, p. 63		
<i>dasypus</i>	Linnaeus, 1766, p. 279		
<i>laticauda</i>	Linnaeus, 1766, p. 280		
<i>turcica</i>	Linnaeus, 1766, p. 281		
<i>testaceoincarnata</i>	Forskål, 1775, p. 5		
<i>incarnata</i>	Forskål, 1775, p. VI		
<i>vulgaris</i>	Forskål, 1775, p. VII		
<i>saxatilis</i>	Gmelin, 1789, p. 769		
<i>norwegica</i>	Gmelin, 1789, p. 770		All 5 names were described in the account of <i>C. domestica</i> , at the same taxonomic level as <i>livia</i> , under different Greek letters; <i>livia</i> was considered to have been accorded precedence through implicit first reviser action by Temminck (1813, p. 451) (see Donegan 2015, p. 27).
<i>barbarica</i>	Gmelin, 1789, p. 770		
<i>eques</i>	Gmelin, 1789, p. 771		
<i>jubata</i>	Gmelin, 1789, p. 771		
<i>cristata</i>	Gmelin, 1789, p. 774	Invalid junior homonym of <i>Columba</i> (now <i>Goura</i>) <i>cristata</i> Pallas, 1764 (Donegan, 2015, Supplementary Materials, pp. 1–2).	
<i>maculata</i>	Gmelin, 1789, p. 772	Invalid primary homonym (Donegan 2015, Supplementary Materials, p. 1). Gmelin (1789) proposed the name <i>C. maculata</i> twice, first as a variety after the account of <i>C. domestica</i> (p. 772) and separately for a different species (p. 780). The two names <i>maculata</i> are primary homonyms under Article 53.3, but under Articles 24.1 and 57.7, the name established for a species takes precedence.	

taxonomies. He gave *domestica* ('White-rumped Pigeon') priority over all other names for domestic breeds as well as *livia*, and recognised the 'Stock Pigeon' *C. oenas* as a different species. Reichenbach (1852, p. 25) later used the names *livia* and *oenas* in preference to all other names, but placed *domestica* (and unnamed domestic breeds) within his account of *C. oenas*. Although he erred in his taxonomy, Reichenbach's (1852) nomenclature was sound because the two names he used have priority under that taxonomy. Bonaparte (1854, p. 23) corrected Reichenbach's (1852) taxonomy, recognising *C. oenas* as a wild species that is not domesticated. He also recognised *C. livia* as another wild species that represents the ancestral stock of feral and domestic pigeons. However, rather than reverting to Latham's (1823) names, he maintained Reichenbach's (1852) sequence, applying the junior name *livia* to rock doves, feral pigeons and domestic breeds in preference to *domestica* or other senior names based on domestic breeds. Temminck (1813) earlier had published an important illustrated monograph of pigeons. His vivid illustration of a wild-phenotype rock dove (plate entitled 'Colombe Bizet' *Columba livia* Lath.) (sic.) (see Fig. 4P of Donegan, 2015, Supplementary Materials), and his taxonomy in which other Linnaean names were set out as varieties of *livia* (p. 451), without a doubt also influenced subsequent usage.

7. The wild rock dove is nowadays considered to comprise, or historically to have comprised, between eight and 13 natural, wild allopatric subspecies (Peters, 1937; Gibbs et al., 2001; Dickinson & Remsen, 2013). The validity and distributions of some of these subspecies are difficult to assess due to modern intergradation with feral populations (Goodwin, 1970). Currently recognised subspecies include nominate *livia* Gmelin, 1789, which is considered to encompass natural populations remaining in the British Isles and west Mediterranean through Dalmatia and north Libya, east to the Urals, Caucasus and west Siberia (Gibbs et al., 2001; Dickinson & Remsen, 2013).

8. There is, and since the 1850s has been, an overwhelming majority usage of '*Columba livia*' as the valid species name for rock doves, feral pigeons and domestic breeds. It is difficult adequately to illustrate the widespread nature of such usage through citations in a publication of this nature. A non-exhaustive selection of usages of *Columba livia* as a presumably valid name in leading checklists, selected field guides, family guides, species databases and monographs follows: Hartert et al. (1912, p. 161), Peters (1937, p. 58), Witherby et al. (1940, p. 187), Hellmayr & Conover (1942, p. 431), Vaurie (1965, p. 544), Fitter et al. (1972, p. 171), Goodwin (1983, p. 54), Peterson et al. (1983, p. 130), Robbins et al. (1983, p. 166), Ferguson-Lees et al. (1983, p. 172), Howell & Webb (1995, p. 320), Stotz et al. (1996, p. 158), Baptista et al. (1997, p. 113), Schodde & Mason (1997, p. 17), Snow & Perrins (1998, pp. 839–842), Svensson et al. (1999, p. 200; 2010, p. 214), American Ornithologists Union (2000), Ridgely & Greenfield (2001, p. 170), Gibbs et al. (2001, p. 176), Dickinson (2003, p. 157), Barlow & Wacher (2005, p. 223), Robson (2005, p. 76), Erize et al. (2006, p. 200), Brazil (2009, p. 244), Van Perlo (2009, p. 118), Jeyarajasingam & Pearson (2012, p. 186), Dickinson & Remsen (2013, p. 52), Phillipps & Phillipps (2014, p. 148) and Del Hoyo & Collar (2014, p. 156). The name *C. livia* is also used widely in the scientific literature in diverse research fields, including molecular biology (Johnson et al. 2001), diseases (e.g. Reddy et al. 2007), parasites (e.g. Adang et al., 2008), veterinary science (e.g. Hernández-Divers et al., 2006; Razmyar et al., 2005), homing (Biro et al., 2007; Dell'Araccia et al., 2008), evolution (e.g. Carvalho et al., 2007; Sol, 2008; Rehkaemper et al., 2008), ecology (e.g. Weissgerber, 2008), pest control (Giunchi et al., 2007), comparative psychology (Wright & Katz, 2007) and

building heritage conservation (Haag-Wackernagel & Geigenfeind, 2008). A search of publication databases is illustrative: Google Scholar cited 42,300 publications using the name '*Columba livia*' in 2014 and PubMed includes 1,232. This compares to just 535 and 14 usages respectively of '*Columba domestica*' (e.g. Tryhubczak 1970; Tazara et al. 1994) (*C. livia*: 99% vs. *C. domestica* 1% of the total sample). The name *domestica* has not apparently been afforded species rank in any taxonomic publication (except Oberholser, 1974) or widely-used field guide, family monograph or taxonomic work of which I am aware in the last 100 years. Oberholser (1974) contained various other novel taxonomic arrangements and descriptions that have been criticised (Parkes, 1975; Morony, 1976; Banks & Browning, 1995) and, as in this instance, have not caught on. Any modern usage of the alternative name '*Columba domestica*' as a species name today is so small as to relate largely or solely to a handful of mistakes by non-taxonomists.

9. The name *domestica* is, however, in frequent (but not universal) usage as a subspecific name in trinomials to indicate that an individual or population of these pigeons is of domestic or feral origin. Donegan (2015, p. 27) listed 20 usages of *domestica* as a subspecific name in the periodical literature. Searches revealed 108 examples of subspecific usage in Zoological Abstracts, 64 in PubMed and 1,760 in Google Scholar in 2014 (ca. 4% of the *livia* sample). Usage of such trinomials is infrequent in mainstream avian taxonomy, however. None of the field guides or publications cited in paragraph 3 uses the name *domestica* or a contraction thereof for pigeons, except for Svensson et al.'s (1999, p. 200; 2010, p. 214) annotations of feral pigeons as '*Columba livia* (domest.)' below rock doves listed as *Columba livia*. The contraction 'domest.' is not a 'name' for purposes of the Code, but there have been several appearances of the trinomen *C. livia domestica* in journal articles, for example even in the titles of Poffers et al. (2002), Troccoli (2005), Scullion & Scullion (2007) and Adang et al. (2008). From a priority perspective, usage of this trinomial (a nomenclatural impossibility) might be considered questionable, but these publications do employ *domestica* Linnaeus, 1758, as a presumably valid subspecies name. By affording priority to the name *livia* in the proposed rulings below, this would not prevent those users of bird names who so wish from continuing to use the name *domestica* in trinomials. Given that many individuals of feral populations can be differentiated from wild rock doves due to leucisms and melanisms, trinomials including *domestica* are arguably justifiable under some more liberal subspecies concepts.

10. The name *C. livia* is based on a neotype designated by Donegan (2015, p. 19). This is a specimen that exhibits the ancestral wild-plumage phenotype, taken from one of the few remaining natural populations on Fair Isle, Scotland and accessioned to the Natural History Museum, London (NHMUK) in 1934. The name *C. domestica* was based on a type series of domestic specimens, including two of the 'runt' breed, originally illustrated by Aldrovandi (1600, pp. 462–463) and copied by Willughby (1676, plates 33–34) (all reproduced in Fig. 2 of Donegan, 2015, Supplementary Materials) and a female domestic specimen studied and described in detail but not illustrated by Willughby (1676) (p. 130). The type series cannot be considered 'mixed' under current taxonomy and a lectotype designation for *domestica* is therefore not required to resolve current priority issues (Donegan, 2015, p. 21). The original description of *C. gutturosa* Linnaeus, 1758 referred only to Willughby (1676, p. 121 and plate 34; Fig. 4I of Donegan (2015), Supplementary Materials) and Ray (1713, p. 60), which is an abridged account of Willughby's (1676) description of a domestic pigeon breed. The original description of *C. cucullata* Linnaeus, 1758 was based on *cucullata s. jacobea* of Ray (1713, p. 60),

Albin's (1738, pl. 43) Jacobine Pigeon and *Columba anglica* f. *russica* of Gessner (1555, p. 279, illustrated on p. 267). The type series includes the birds illustrated by Albin (1738; Fig. 4R of Donegan (2015), Supplementary Materials), and Gessner (1555, Fig. 4Q of Donegan (2015), Supplementary Materials) and in the drawing by Willughby (1678, plate 33; Fig. 4G of Donegan (2015), Supplementary Materials) of 'Columba cypria cucullata A Jacobine Pigeon', which was the basis for Ray's (1713) account. These are all domestic pigeons with ornate feathering on the rear crown. The type series of *C. domestica*, *C. gutturosa* and *C. cucullata* are therefore each based upon specimens of different breeds of the same biological species ('*livia*' in current usage) and subspecies ('*domestica*' for those who assign domestic and feral birds to a subspecies and recognise only one valid name for it, which is the only more or less widespread taxonomic usage for domestic birds today involving a name other than simply *livia*).

11. The conditions of Article 23.9.1 for reversal of precedence without a Commission ruling are not met for *domestica* due to its usage as a subspecific name in trinomials and its rare use as a specific name (e.g. Tryhubczak, 1970; Oberholser, 1974; Tazawa et al., 1994). The conditions for reversal of precedence of either *C. domestica* or *C. livia* with respect to *C. cucullata* and *C. gutturosa* are not met due to post-1899 usage of the latter names in a handful of non-taxonomic scientific journal articles, cited in Table 1. Articles 17.2 and Article 23.8 of the Code, which relate to names based on hybrids, are not applicable to *domestica*. Domestic pigeon varieties appear to have resulted from selective breeding rather than hybridisation (e.g. Price, 2002; Dybus & Knapik, 2005; Kan et al., 2010; Stringham et al., 2012), although individuals of different wild populations may have been captured and their genotype inserted over the history of pigeon domestication (Stringham et al., 2012). It has been argued that some names based on specimens of domestic breeds may be unavailable on account of being based on hybrids (e.g. Dennler de la Tour, 1959, 1968), but several such names were recently added to the Official List (BZN 60: 81–84, 2003). In this instance, molecular studies present no evidence of a hybrid origin for domestic or feral *C. livia* (Stringham et al., 2012).

12. The current usage of the name '*Columba livia*' and trinomial '*Columba livia domestica*' are, for both, contrary to the Principle of Priority (Article 23.1 of the Code). The Commission is invited here to correct this long-running and untenable situation in avian taxonomy. *Columba livia* is probably one of the most widely used animal names in the world and may be the most widely used bird name, such that having a threat based on priority hanging over it is highly undesirable. Alternative approaches applied recently to names given to domestic and wild populations (e.g. Opinion 2027, BZN 60: March 81–84, 2003; and Opinion 2215, BZN 65(4); 327–328, December 2008) seem inappropriate for *C. livia*, owing to the different pattern of prevailing usage in relation to this name and the particular issues created by the many descriptions for different domestic pigeon breeds in the 1700s.

13. The International Commission on Zoological Nomenclature is accordingly asked to use its plenary power to rule:

- (1) that the name *livia* Gmelin, 1789, as published in the binomen *Columba livia*, has precedence over each of the following names whenever any of following is considered synonymous with it:
 - (a) *domestica* Linnaeus, 1758, as published in the binomen *Columba domestica*;
 - (b) *gutturosa* Linnaeus, 1758, as published in the binomen *Columba gutturosa*; and
 - (c) *cucullata* Linnaeus, 1758, as published in the binomen *Columba cucullata*.

- (2) that the name *domestica* Linnaeus, 1758, as used in the binomen *Columba domestica* or the trinomen *Columba livia domestica*, has precedence over each of the following names whenever either of the following is considered synonymous with it, notwithstanding the precedence that would otherwise be afforded under Article 24.1 of the Code:
- (a) *gutturosa* Linnaeus, 1758, as published in the binomen *Columba gutturosa*;
 - (b) *cucullata* Linnaeus, 1758, as published in the binomen *Columba cucullata*;
- (3) to place on the Official List of Specific Names in Zoology the following names:
- (a) *livia* Gmelin, 1789, as published in the binomen *Columba livia*, with the endorsement that it has precedence over the names *domestica* Linnaeus, 1758, as published in the binomen *Columba domestica*, *gutturosa* Linnaeus, 1758, as published in the binomen *Columba gutturosa* and *cucullata* Linnaeus, 1758, as published in the binomen *Columba cucullata*, whenever any of the latter three names is considered synonymous with it; and
 - (b) *domestica* Linnaeus, 1758, as published in the binomen *Columba domestica*, with the endorsement that it has precedence over the names *gutturosa* Linnaeus, 1758, as published in the binomen *Columba gutturosa* and *cucullata* Linnaeus, 1758, as published in the binomen *Columba cucullata*, whenever either of the latter two names is considered synonymous with it, but that it shall not have precedence over the name *livia* Gmelin, 1789, as published in the binomen *Columba livia*, whenever the two names are considered synonyms.
 - (c) *gutturosa* Linnaeus, 1758, as published in the binomen *Columba gutturosa*, with the annotation that it is not to be given precedence over *domestica* Linnaeus, 1758, as published in the binomen *Columba domestica* or in the trinomen *Columba livia domestica*, nor over *livia* Gmelin, 1789, as published in the binomen *Columba livia*, when either of the latter names is considered synonymous with it.
 - (d) *cucullata* Linnaeus, 1758, as published in the binomen *Columba cucullata*, with the annotation that it is not to be given precedence over *domestica* Linnaeus, 1758, as published in the binomen *Columba domestica* or in the trinomen *Columba livia domestica*, nor over *livia* Gmelin, 1789, as published in the binomen *Columba livia*, when either of the latter names is considered synonymous with it.

Acknowledgements

I would like to thank all persons mentioned in Donegan (2015) for their contributions, which also led to this case being developed.

References

- Adang, K.L., Oniye, S.J., Ezealor, A.U., Abdu, P.A. & Ajanusi, O.J. 2008. Ectoparasites of domestic pigeon (*Columba livia domestica*, Linnaeus) in Zaria, Nigeria. *Research Journal of Parasitology*, 3(2): 79–84.
- Albin, E. 1738. A natural history of birds, illustrated with a hundred and one copper plates, engraven from the life, vol. 96 pp., 101 pls. William Innys & John Brindley, London.
- Aldrovandi, U. 1600. Ornithologiae. Tomus alter. 862 pp. Baptista Bellagamba, Bologna.
- American Ornithologists' Union. 2000. The A.O.U. checklist of North American birds. *Auk*, 117: 847–858.
- Aristotle. c. 350BC. *The History of Animals*. English translation.

- Banks, R.C. & Browning, M.R.** 1995. Comments on the status of revived old names for some North American birds. *Auk*, **112**(3): 633–648.
- Baptista, L.F., Trail, P.W. & Horblit, H.M.** 1997. Family Columbidae (pigeons and doves). Pp. 60–243 in del Hoyo, J. et al. (Eds.), *Handbook of the birds of the world, vol. 4. Sandgrouse to cuckoos*. Lynx Editions, Barcelona.
- Barlow, C. & Wacher, T.** 2005. The birds of the Gambia and Senegal. 400 pp. Christopher Helm and A & C Black, London.
- Bewick, T.** 1797. *History of British birds. Vol. 1 containing the history and description of land birds*. 335 pp. Sol. Hodgson, for Beilby & Bewick and C. C. & J. Robinson, Newcastle & London.
- Biro, D., Freeman, R., Meade, J., Roberts, S. & Guilford, T.** 2007. Pigeons combine compass and landmark guidance in familiar route navigation. *Proceedings of the National Academy of Sciences of the United States of America*, **104**(18): 7471–7476.
- Bonaparte, C.L.** 1854. Coup d'oeil sur l'ordre des pigeons (troisième partie). *Comptes Rendus des Séances de l'Académie des Sciences*, **39–40**: 1102–1112.
- Brazil, M.** 2009. *Birds of East Asia: China, Taiwan, Korea, Japan and Russia*. 528 pp. Princeton Field Guides, Princeton, New Jersey.
- Brisson, M.-J.** 1760. Ornithologia sive synopsis methodica sistens avium divisionem in ordines, sectiones, genera, species, ipsarumque varietates, vol. 1. (Ornithologie ou méthode contenant la division des oiseaux en ordres, sections, genres, espèces et leurs variétés, vol. 1.) 516 pp. Jean-Baptiste Bauche, Paris.
- British Ornithologists' Union.** 2013. *The British list: A checklist of birds of Britain* (8th edition). *Ibis*, **155**: 635–676.
- Brünnich, M.T.** 1764. Ornithologia borealis, sistens collectionem, avium ex omnibus, imperio Danico subjectis, provinciis insulisque borealibus Hafniæ factam, cum descriptionibus novarum, nominibus incolarum, locis natalium et icone. 80 pp. J.C. Kall, Hafniae.
- Buffon, G.L.L.** 1771. *Histoire naturelle des oiseaux*, vol. 2. 560 pp. Imprimerie Royale, Paris.
- Carvalho, L.S., Cowing, J.A., Wilkie, S.E., Bowmaker, J. K. & Hunt, D.M.** 2007. The molecular evolution of avian ultraviolet- and violet-sensitive visual pigments. *Molecular Biology and Evolution*, **24**(8): 1843–1852.
- Darwin, C.** 1859. *On the origin of species by means of natural selection, or the preservation of favoured races in the struggle for life*. 502 pp, John Murray, London.
- Darwin, C.** 1868. *The variation of animals and plants under domestication*, vol. 1. 411 pp. John Murray, London.
- Del Hoyo, J. & Collar, N.J.** 2014. *Illustrated checklist of the birds of the world. Volume 1 (non-passerines)*. 904 pp. Lynx Edicions, Barcelona & BirdLife International, Cambridge.
- Dell'Araccia, G., Dell'Omo, G., Wolfer, D.P. & Lipp, H.-P.** 2008. Flock flying improves pigeons' homing: GPS track analysis of individual flyers versus small groups. *Animal Behaviour*, **76**(4): 1165–1172.
- Dennler de La Tour, G.** 1960. La descendencia del perro. *Actas y Trabajos del Primer Congreso Sudamericano de Zoología*, **4**: 215–223.
- Dennler de La Tour, G.** 1968. Zur Frage der Haustier-Nomenklatur. *Sciuetierkundliche Mitteilungen*, **16**: 1–20.
- Dickinson, E.C.** (Ed.). 2003. *The Howard and Moore complete checklist of the birds of the World*. Revised and enlarged 3rd Edition. 1040 pp. Christopher Helm, London.
- Dickinson, E.C. & Remsen, J.V.** (Eds.). 2013. *The Howard and Moore complete checklist of the birds of the world, Volume 1: non-passerines. 4th edition*. 461 pp. Aves Press, London.
- Donegan, T.M.** 2015. The pigeon names *Columba livia*, '*C. domestica*' and *C. oenas* and their type specimens. *Bulletin of the British Ornithologists' Club*, **136**(1): 15–28.
- Dybus, A. & Knapik, K.** 2005. A new PCR-RFLP within the domestic pigeon (*Columba livia* var. *domestica*) cytochrome b (MTCYB) gene. *Journal of Applied Genetics*, **46**: 315–317.
- Ericson, P.G.P. & Tyrberg, T.** 2004. *The early history of the Swedish avifauna. A review of the subfossil record and early written sources*. 349 pp. Kungliga Vitterhets Historie och Antikvitets Akademien, Stockholm.
- Erize, F., Rodriguez-Mata, J.R. & Rumboll, M.** 2006. Birds of South America: non-passerines. 376 pp. Princeton Univ. Press.

- Ferguson-Lees, J., Willis, I. & Sharrock, J.T.R.** 1983. *The Shell guide to the birds of Britain and Ireland*. 336 pp. Michael Joseph Ltd.
- Fitter, R.S.R., Heinzel, H. & Parslow, J.L.F.** 1972. *The birds of Britain and Europe with North Africa and the Middle East*. 320 pp. Collins, London.
- Forskål, P.** 1775. *Descriptiones animalium, avium, amphibiorum, piscium, insectorum, vermium quae in itinere orientali observavit*. 19, XXXIV, 164 pp. Heineck & Faber, Hauniae.
- Gentry, A., Clutton-Brock, J. & Groves, C.P.** 2004. The naming of wild animal species and their domestic derivatives. *Journal of Archaeological Science*, **31**: 645–651.
- Gessner, C.** 1555. *Historiae animalium*, Lib. III. 779 pp. Christoph Froschauer, Zurich.
- Gibbs, D., Barnes, E. & Cox, J.** 2001. *Pigeons and doves. A guide to the pigeons and doves of the world*. 615 pp. Yale University Press, New Haven, U.S.A. & London and A. & C. Black / Christopher Helm, London.
- Giunchi, D., Baldaccini, N.E., Sbragia, G. & Soldatini, C.** 2007. On the use of pharmacological sterilisation to control feral pigeon populations. *Wildlife Research*, **34**(4): 306–318.
- Gmelin, J.F.** 1789. *Systema Naturae*, Ed. 13, vol. 1, pt. 2. 769 pp. Apud J.B. Delamollière, Lugduni.
- Goodwin, D.** 1983. *Pigeons and Doves of the World*, 3rd edition. 363 pp. Cornell University Press, Ithaca.
- Haag-Wackernagel, D. & Geigenfeind, I.** 2008. Protecting buildings against feral pigeons. *European Journal of Wildlife Research*, **54**(4): 715–721.
- Hartert, E., Jourdain, F.C. R., Ticehurst, N. F. & Witherby, H.F.** 1912. *A hand-list of British birds, with an account of the distribution of each species in the British Isles and abroad*. 237 pp. Witherby & Co., London.
- Hassanpour, H., Zarei, H. & Hojjati, P.** 2011. Analysis of electrocardiographic parameters in Helmeted Guinea Fowl (*Numida meleagris*). *Journal of Avian Medicine & Surgery*, **25**(1): 8–13.
- Hellmayr, C.E. & Conover, B.** 1942. *Catalogue of birds of the Americas and the adjacent islands. Part 1 No. 1*. 636 pp. Zoological Series, Field Museum of Natural History, vol. 13 Publication 514.
- Hernández-Divers, S.J., Wilson, G.H., Lester, V.K., Hernández-Divers, S.M., Latimer, K.S. & Ritchie, B.W.** 2006. Evaluation of coelioscopic splenic biopsy and cloacoscopic bursa of Fabricius biopsy techniques in pigeons (*Columba livia*). *Journal of Avian Medicine and Surgery*, **20**(4): 234–241.
- Howell, S.N.G. & Webb, S.** 1995. *A guide to the birds of Mexico and northern Central America*. 851pp. Oxford University Press, Oxford.
- Jeyarajasingam, A. & Pearson, A.** 2012 *A field guide to the birds of peninsular Malaysia and Singapore*. 447 pp. Oxford University Press, Oxford.
- Johnson, K.P., Kort, S. de., Dinwoodey, K., Mateman, A.C., ten Cate, C., Lessels, C.M. & Clayton, D.H.** 2001. A molecular phylogeny of the dove genera *Streptopelia* and *Columba*. *The Auk*, **118**(4): 874–887.
- Kan, X. V., Li, X. F., Zhang, L. Q., Chen, L., Qian, C. J., Zhang, X. W. & Wang, L.** 2010. Characterization of the complete genome of the Rock Pigeon *Columba livia* (Columbiformes: Columbidae). *Genetics and Molecular Research*, **9**: 1234–1249.
- Latham, J.** 1823. *A general history of birds, vol. 8*. 416 pp. Jacob & Johnson, London.
- Linnaeus, C.** 1758. *Systema naturae*, Ed. 10, vol. 1. 824 pp. Salvius, Holmiae.
- Linnaeus, C.** 1766. *Systema naturae*, Ed. 12, vol. 1. 532 pp. Laurentius Salvius, Stockholm.
- López Murcia, M. M., Bernal, L.J., Montes, A. M., García Martínez, J. D. & Ayala, I.** 2005. The normal electrocardiogram of the unanaesthetized competition ‘Spanish Poulter’ Pigeon (*Columba livia gutturosa*). *Journal of Veterinary Medicine Series A*, **52**(7): 347–349.
- Morony, J.J.** 1976. Review of: “The bird life of Texas”. Harry C. Oberholser. 1974. *Auk*, **93**: 393–396.
- Oberholser, H.C.** 1974. *The bird life of Texas*, 2 vols. 1069 pp. University of Texas Press, Austin, U.S.A.
- Parkes, K.P.** 1975. The scientific names in Oberholser’s “The bird life of Texas”. *American Birds*, **29**: 17–18.
- Peters, J.L.** 1937. *Check-list of birds of the world*, vol. 3. 311 pp. Harvard University Press, Cambridge, Massachusetts.

- Peterson, R.T., Mountfort, G. & Hollom, P.A.D.** 1983. *A field guide to the birds of Britain and Europe. 4th edition.* 240 pp. Collins, London.
- Phillipps, Q. & Phillipps, K.** 2014. *Phillipps' field guide to the birds of Borneo, Sabah, Sarawak, Brunei and Kalimantan.* 366 pp. Beaufoy Books, Oxford.
- Poffers, J., Lumeij, J.T. & Redig, P.T.** 2002. Investigations into the uricolytic properties of urate oxidase in a granivorous (*Columba livia domestica*) and in a carnivorous (*Buteo jamaicensis*) avian species. *Avian Pathology*, **31**(6): 573–579.
- Pontoppidan, E.** 1763. *Den Danske Atlas Eller Konge-Riget Dannemark, med dets Naturlige Egenskaber, Elementer, Indbyggere, Baexter, Dyr og andre Affodninger, dets gamle Tildrageiser of naervaerene Omstaendigheder i alle Provintzer, Staeder, Kirker, Slotte og Herre-Gaarde*, vol 1. xi, 723 pp. A.H. Godiche, Kiøbenhavn.
- Price, T. D.** 2002. Domesticated birds as a model for the genetics of speciation by sexual selection. *Genetica*, **116**: 311–237.
- Ray, J.** 1713. *Synopsis methodica avium et piscium.* [2], 198, [18], 166, [12] p., [4] leaves of plates, Gulielmi Innys, London.
- Razmyar, J., Dezfoulian, O., Shojadoost, B., Masoudifard, M. & Peighambari, S.M.** 2005. Sertoli cell tumor in a pigeon (*Columba livia*). *Journal of Avian Medicine and Surgery*, **19**(4): 286–288.
- Reddy, M.R., Lepore, T.J., Pollack, R.J., Kiszewski, A.E., Spielman, A. & Reiter, P.** 2007. Early evening questing and oviposition activity by the *Culex* (Diptera: Culicidae) vectors of West Nile virus in northeastern North America. *Journal of Medical Entomology*, **44**(2): 211–214.
- Rehkaemper, G., Frahm, H.D. & Cnotka, J.** 2008. Mosaic evolution and adaptive brain component alteration under domestication seen on the background of evolutionary theory. *Brain Behavior and Evolution*, **71**(2): 115–126.
- Reichenbach, L.** 1852. *Avium systema naturale: das natürliche System der Vögel.* 36, xxxi pp. H. W. Schultz, Dresden & Leipzig.
- Ridgely, R.S. & Greenfield, P.J.** 2001. *The birds of Ecuador*, vol. 1. 848 pp. Cornell University Press, Ithaca.
- Robbins, C.S., Bruun, B., Zim, H.Z. & Singer, A.** 1983. *A guide to field identification: birds of North America. Revised Edition.* 360 pp. Golden Press, New York, U.S.A.
- Robson, C.** 2005. *New Holland field guide to the birds of South-east Asia.* 304 pp. New Holland Publishers, London.
- Schodde, R. & Mason, I.J.** 1997. *Zoological catalogue of Australia 37.2: Aves (Columbidae to Coraciidae).* 440 pp. CSIRO Publishers, Collingwood.
- Scullion, F.T. & Scullion, M.G.** 2007. Pathologic findings in racing pigeons (*Columba livia domestica*) with 'young bird sickness'. *Journal of Avian Medicine and Surgery*, **21**(1): 1–7.
- Seng, H.** 1913. *Untersuchungen mit Hühnereigelb-Antiserum.* 13 pp. Jena Fischer, Heidelberg.
- Seng, H.** 1915. Untersuchungen mit Hühnereigelb-Antiserum. *Zeitschrift für Immunitätsforschung*, **20**: 355.
- Sievers, O.** 1939. Eine serologische Untersuchung von Vogeleiern, mit besonderer Berücksichtigung der Möglichkeit, verschiedene Vogelarten zu differenzieren. *Acta Pathologica Microbiologica Scandinavica*, **16**: 44–98.
- Snow, D.W. & Perrins, C.M.** 1998. *The birds of the Western Palearctic.* Concise edition, vol. 1. 1008 pp. Oxford University Press, Oxford.
- Sol, D.** 2008. Artificial selection, naturalization, and fitness: Darwin's pigeons revisited. *Biological Journal of the Linnean Society*, **93**(4): 657–665.
- Stotz, D.F., J.W. Fitzpatrick, T.A. Parker III & D.K. Moskovits.** 1996. *Neotropical Birds: Ecology and Conservation.* 482 pp. Chicago University Press. Chicago, U.S.A.
- Stringham, S.A., Mulroy, E.M., Xing, J., Record, D., Guernsey, M.W., Aldenhoven, J. T., Osborne, E.J. & Shapiro, M.D.** 2012. Divergence, convergence, and the ancestry of feral populations in the domestic rock pigeon. *Current Biology*, **22**(4): 302–308.
- Svensson, L., Grant, P. J., Mullarney, K. & Zetterstrom, D.** 1999. *Collins bird guide.* 399 pp. HarperCollins, London.
- Svensson, L., Mullarney, K. & Zetterstrom, D.** 2010. *Collins bird guide.* 2nd edition. 448 pp. Collins, London.

- Tazawa, H., Watanabe, W. & Burggren, W.W.** 1994. Embryonic heart rate in altricial birds, the pigeon (*Columba domestica*) and the bank swallow (*Riparia riparia*). *Physiological Zoology*, **67**(6): 1448–1460.
- Temminck, C.J.** 1813. *Histoire naturelle générale des pigeons et des gallinacés*. 499 pp. J.C. Sepp & Fils, Amsterdam & G. Dufour, Paris.
- Townsend, C.W.** 1915. Notes on the Rock Dove (*Columba domestica*). *Auk*, **32**: 306–316.
- Troccoli, C.** 2005. Phenotypic composition, pathologies and traumas of urban feral pigeon, *Columba livia domestica*, in Rome. *Alula*, **12**(1–2): 214–228.
- Tryhubczak, A.** 1970. The striatum of the pigeon (*Columba domestica*) and House-sparrow (*Passer domesticus*). *Acta Biologica Cracoviensia Series Zoologica*, **13**: 19–27.
- Van Perlo, P.** 2009. *A field guide to the birds of Brazil*. 465 pp. Oxford University Press.
- Vaurie, C.** 1965. *The birds of the palearctic fauna: a systematic reference. Non-Passeriformes*. 763 pp. H.F. & G. Witherby, London.
- Weissergerber, R.** 2008. Wanderfalke *Falco peregrinus* und Haustaube *Columba livia f. domestica* als unmittelbare Brutnachbarn. *Ornithologische Mitteilungen*, **60**(9): 314–315.
- Willughby, F.** 1676. *Ornithologiae libri tres*. 307 pp. John Martyn, London.
- Willughby, F.** 1678. *The ornithology of F. Willughby of Middleton*. *Trans. J. Ray*. [xii,] 441, [6] pp., 80 pls. Printed by A.C. for John Martyn, London.
- Witherby, H.F., Jourdain, F.C.R., Ticehurst, N.F. & Tucker, B.W.** 1940. *The handbook of British birds. Volume IV: cormorants to crane. 7th impression*. 471 pp. H.F. & G. Witherby Ltd., London.
- Wright, A.A. & Katz, J.S.** 2007. Generalization hypothesis of abstract-concept learning: Learning strategies and related issues in *Macaca mulatta*, *Cebus apella*, and *Columba livia*. *Journal of Comparative Psychology*, **121**(4): 387–397.

Acknowledgement of receipt of this application was published in BZN 72: 108.

Comments on this case are invited for publication (subject to editing) in the *Bulletin*; they should be sent to I.C.Z.N., Natural History Museum, Cromwell Road, London SW7 5BD, U.K. (e-mail: iczn@nhm.ac.uk).